WHAT IS CLAIMED IS:

1. Receiver apparatus for digital signals of a prescribed baud rate transmitted by respective amplitude-modulated radio-frequency carriers through a medium subject to multipath distortion, said receiver apparatus comprising:

a receiver front-end connected for responding to any selected one of said digital signals transmitted by respective amplitude-modulated radio-frequency carriers through a medium subject to multipath distortion, to generate an amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion thereof;

a first adaptive digital filter having a kernel composed of weighting coefficients that can be adjusted, said first adaptive digital filter connected for supplying first adaptive filter response to said amplitude-modulated intermediate-frequency carrier as amplitude-modulated in accordance with said selected one of said digital signals;

apparatus for computing discrete Fourier transforms responsive to successive portions of said amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion thereof, said successive portions of said amplitude-modulated intermediate-frequency carrier generally being contiguous in time; and

apparatus for computing the weighting coefficients of said adaptive filter so as to suppress first adaptive filter response arising from the amplitude of said amplitude-modulated intermediate-frequency carrier being modulated in accordance with multipath distortion of said selected one of said digital signals, with the computations of said weighting coefficients being based on said discrete Fourier transforms.

2. The claim 1 receiver apparatus, wherein said first adaptive digital filter is a baseband filter; and wherein said receiver apparatus further comprises, within said apparatus for computing discrete Fourier transforms responsive to successive portions of said amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion:

demodulator and oversampling analog-to-digital conversion circuitry connected to receive said amplitude-modulated intermediate-frequency carrier from said receiver front-end and to supply a digital baseband signal sampled at an oversampling rate higher than said prescribed baud rate, which digital baseband signal is applied as a respective input signal to said first adaptive digital filter; and

apparatus for computing said discrete Fourier transforms from successive portions of said digital baseband signal, which successive portions of said digital baseband signal respectively result from demodulation of said successive portions of said amplitude-modulated intermediate-frequency carrier, said demodulator and oversampling analog-to-digital conversion circuitry being connected to supply said digital baseband signal to said apparatus for computing said discrete Fourier transforms from successive portions of said digital baseband signal.

3. The claim 2 receiver apparatus, wherein the kernel of said adaptive filter has weighting coefficients at intervals corresponding with integral numbers of half cycles of said oversampling rate, said receiver apparatus further comprising:

a decimation filter connected for re-sampling said first adaptive filter response to generate, as a decimation filter response, a digital baseband signal re-sampled at said prescribed baud rate; and

decoding apparatus connected for decoding said decimation filter response to recover a data stream.

4. The claim 3 receiver apparatus, as constructed for the reception of vestigial-sideband digital television broadcast signals, wherein said decoding apparatus comprises:

trellis decoding apparatus for decoding said decimation filter response to generate trellis-decoded data, said trellis decoding apparatus being connected to receive said decimation filter response from said decimation filter;

a data de-interleaver for de-interleaving convolutional interleaving in said trellis-decoded data to generate a data de-interleaver response, said data de-interleaver being connected to receive said trellis-decoded data from said trellis decoding apparatus;

Reed-Solomon error correction circuitry for correcting errors in said de-interleaver response to recover randomized data, said Reed-Solomon error correction circuitry being connected to receive said data de-interleaver response from said data de-interleaver; and

a data de-randomizer for de-randomizing said randomized data to recover a transport stream for application to a further portion of said receiver apparatus.

5. The claim 3 receiver apparatus, wherein said apparatus for computing the weighting coefficients of said adaptive filter comprises:

estimation circuitry responsive to said decimation filter response for generating an oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated;

apparatus for computing the discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, which successive portions of said oversampling-rate estimation of the baseband digital modulating signal correspond with respective ones of said successive portions of said digital baseband signal used for computing discrete Fourier transforms in said apparatus for computing the discrete Fourier transforms of successive portions of said digital baseband signal;

read-only memory for storing a discrete Fourier transform characterization of ideal channel response;

computer circuitry for generating discrete Fourier transform characterizations of the actual reception channel, through term-by-corresponding-term multiplication of each of said discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal by said discrete Fourier transform characterization of ideal reception channel response as read from read-only memory, followed by term-by-corresponding-term division of the resulting product terms by the discrete Fourier transform of the portion of said digital baseband signal corresponding with that said successive portion of said oversampling-rate estimation of the baseband digital modulating signal generating said discrete Fourier transform thereof used in said term-by-corresponding-term multiplication, followed by inverse discrete Fourier transformation of the resulting quotient terms to generate one of a set of successive inverse discrete Fourier transforms; and

a bank of digital lowpass filters for smoothing the terms of said successive inverse discrete Fourier transforms to specify the weighting coefficients in the kernel of said adaptive filter.

6. The claim 5 receiver apparatus, wherein said estimation circuitry comprises:

a data slicer connected to receive said decimation filter response from said adaptive filter and to supply a quantized decimation filter response;

a symbol coder for recoding said quantized decimation filter response into a baud-rate estimation of the baseband digital modulating signal; and

an interpolation filter of a type that substantially preserves in its output signal the system function described in its input signal, said interpolation filter connected for receiving said baud-rate estimation of the baseband digital modulating signal and for supplying said oversampling-rate estimation of the baseband digital modulating signal to said apparatus for computing the discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated.

7. The claim 5 receiver apparatus, wherein said estimation circuitry comprises:

a trellis decoder also included within said decoding apparatus connected for decoding said decimation filter response to recover a data stream, said trellis coder connected to receive said decimation filter response from said adaptive filter and to supply preliminary estimates of symbol values as well as a trellis decoder response;

a symbol coder for recoding said preliminary estimates of symbol values supplied from said trellis decoder response, to generate a baud-rate estimation of the baseband digital modulating signal; and

an interpolation filter of a type that substantially preserves in its output signal the system function described in its input signal, said interpolation filter connected for receiving said baud-rate estimation of the baseband digital modulating signal and for supplying said oversampling-rate estimation of the baseband digital modulating signal to said apparatus for computing the discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated.

8. The receiver apparatus of claim 5 for single-carrier digital modulation signals, wherein said apparatus for computing the discrete Fourier transforms of successive portions of each data field of said digital baseband signal is of a type using a sliding window of said digital baseband signal for such computation, and wherein said apparatus for computing the discrete Fourier transforms of successive portions of said oversampling-rate estimation is of a type using a sliding window of said oversampling-rate estimation for such computation.

9. The claim 3 receiver apparatus, wherein said apparatus for computing the weighting coefficients of said adaptive filter comprises:

estimation circuitry responsive to said decimation filter response for generating a Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated;

apparatus for computing the discrete Fourier transforms of successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, which successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal correspond with respective ones of said successive portions of said digital baseband signal used for computing discrete Fourier transforms in said apparatus for computing the discrete Fourier transforms of successive portions of said digital baseband signal;

computer circuitry for generating discrete Fourier transform descriptions of the kernel desired in said adaptive filter through term-by-corresponding-term division of each of the discrete Fourier transforms of successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal by the discrete Fourier transform of the corresponding portion of said digital baseband signal, and thereafter generating inverse discrete Fourier transforms of said discrete Fourier transform descriptions of the kernel desired in said adaptive filter; and

a bank of digital lowpass filters for smoothing the terms of said inverse discrete Fourier transforms to specify the weighting coefficients in the kernel of said adaptive filter.

10. The claim 9 receiver apparatus, wherein said estimation circuitry comprises:

a data slicer connected to receive said decimation filter response from said adaptive filter and to supply a quantized decimation filter response;

a symbol coder for recoding said quantized decimation filter response into a baud-rate estimation of the baseband digital modulating signal; and

an interpolation filter connected for receiving said baud-rate estimation of the baseband digital modulating signal and supplying said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal to said apparatus for computing the discrete Fourier transforms of successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated.

11. The claim 9 receiver apparatus, wherein said estimation circuitry comprises:

a trellis decoder also included within said decoding apparatus connected for decoding said decimation filter response to recover a data stream, said trellis coder connected to receive said decimation filter response from said adaptive filter and to supply preliminary estimates of symbol values as well as a trellis decoder response;

a symbol coder for recoding said preliminary estimates of symbol values supplied from said trellis decoder response, to generate a baud-rate estimation of the baseband digital modulating signal; and

an interpolation filter connected for receiving said baud-rate estimation of the baseband digital modulating signal and supplying said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal to said apparatus for computing the discrete Fourier transforms of successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated.

12. The receiver apparatus of claim 9 for single-carrier digital modulation signals, wherein said apparatus for computing the discrete Fourier transforms of successive portions of each data field of said digital baseband signal is of a type using a sliding window of said digital baseband signal for such computation, and wherein said apparatus for computing the discrete Fourier transforms of successive portions of said Nyquist-filtered oversampling-rate estimation is of a type using a sliding window of said Nyquist-filtered oversampling-rate estimation for such computation.

13. The claim 1 receiver apparatus; wherein said first adaptive digital filter is a baseband filter connected for responding to a real component of a digital baseband signal; and wherein said receiver apparatus further comprises, within said apparatus for computing discrete Fourier transforms responsive to successive portions of said amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion:

a controlled oscillator for generating in-phase and quadrature-phase oscillations, the frequency and phase of which oscillations are controlled by an automatic frequency and phase control signal;

a first mixer connected for mixing said amplitude-modulated intermediate-frequency carrier supplied from receiver front-end with said in-phase oscillations to generate a first mixer response;

a first analog lowpass filter connected to receive said first mixer response as a respective input signal and to supply an analog in-phase baseband signal in response thereto;

a first analog-to-digital converter connected for digitizing said analog in-phase baseband signal to generate an digital in-phase baseband signal sampled at an oversampling rate higher than said prescribed baud rate and applied to said first adaptive digital filter as its respective input signal; and

apparatus for computing said discrete Fourier transforms from successive portions of said digital in-phase baseband signal, which successive portions of said digital in-phase baseband signal respectively result from demodulation of said successive portions of said amplitude-modulated intermediate-frequency carrier, said first analog-to-digital converter being connected to supply said digital in-phase baseband signal to said apparatus for computing said discrete Fourier transforms from successive portions of said digital in-phase baseband signal.

14. The claim 13 receiver apparatus, further comprising:

a second mixer connected for mixing said amplitude-modulated intermediate-frequency carrier supplied from receiver front-end with said quadrature-phase oscillations to generate a second mixer response;

a second analog lowpass filter connected to receive said second mixer response as a respective input signal and to supply an analog quadrature-phase baseband signal in response thereto;

a second analog-to-digital converter connected for digitizing said analog quadrature-phase baseband signal to generate a digital quadrature-phase baseband signal sampled at said oversampling rate higher than said prescribed baud rate;

a second adaptive filter of having a kernel composed of weighting coefficients that can be adjusted to be similar to said kernel of said first adaptive digital filter, said second analog-to-digital converter being connected to said second adaptive filter for applying said digital quadrature-phase baseband signal to said second adaptive filter as a its respective input signal, said second adaptive filter supplying a second first adaptive filter response to its input signal as convolved with said kernel of said second adaptive digital filter;

a digital-to-analog converter connected to receive as its respective input signal said second adaptive filter response from said second adaptive filter and connected to supply an analog second adaptive filter response;

a third analog lowpass filter connected to receive as its respective input signal said analog second adaptive filter response from said digital-to-analog converter and to supply a third analog lowpass filter response therefrom to said controlled oscillator as said automatic frequency and phase control signal.

a decimation filter connected for re-sampling said first adaptive filter response to generate, as a decimation filter response, an in-phase digital baseband signal re-sampled at said prescribed baud rate;

decoding apparatus connected for decoding said decimation filter response to recover a data stream;

estimation circuitry responsive to said decimation filter response for generating an oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated;

apparatus for computing the discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, which successive portions of said oversampling-rate estimation of the baseband digital modulating signal correspond with respective ones of said successive portions of said digital baseband signal used for computing discrete Fourier transforms in said apparatus for computing the discrete Fourier transforms of successive portions of said digital baseband signal;

computer circuitry for generating discrete Fourier transform characterizations of the actual reception channel through term-by-corresponding-term division of each of the discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal by the discrete Fourier transform of the corresponding portion of said digital baseband signal, thereafter generating discrete Fourier transform descriptions of the kernel desired in each of said first and said second adaptive filters through term-by-corresponding-term division of each of the discrete Fourier transform characterizations of the actual reception channel by a discrete Fourier transform characterization of an ideal reception channel, and thereafter generating inverse discrete Fourier transforms of said discrete Fourier transform descriptions of the kernel desired in each of said first and said second adaptive filters; and

a bank of digital lowpass filters for smoothing the terms of said inverse discrete Fourier transforms to specify the weighting coefficients in the kernel of each of said first and said second adaptive filters.

15. The claim 1 receiver apparatus, further comprising:

analog-to-digital conversion circuitry connected to receive as its respective input signal said amplitude-modulated intermediate-frequency carrier from said receiver front-end and to supply, at an oversampling rate higher than said prescribed baud rate, a digitized amplitude-modulated intermediate-frequency carrier applied as respective input signals to said first adaptive digital filter and to said apparatus for computing discrete Fourier transforms responsive to successive portions of said amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion thereof;

a digital controlled oscillator for supplying at said oversampling rate digital descriptions of in-phase oscillations and quadrature-phase oscillations, the frequency and phase of which oscillations are controlled by an automatic frequency and phase control signal;

digital synchrodyne circuitry for supplying a digital baseband signal in response to said first adaptive filter response, said adaptive filter connected to apply said first adaptive filter response to said digital synchrodyne circuitry as a respective input signal thereof, said digital controlled oscillator connected for supplying said descriptions of said in-phase oscillations to said digital synchrodyne circuitry for synchrodyning with said first adaptive filter response to generate a real component of said digital baseband signal at said oversampling rate, said controlled oscillator connected for supplying said descriptions of said quadrature-phase oscillations to said digital synchrodyne circuitry for synchrodyning with said first adaptive filter response to generate an imaginary component of said digital baseband signal at said oversampling rate;

a digital lowpass filter connected to receive said imaginary component of said digital baseband signal from said digital synchrodyne circuitry and connected to supply its lowpass filter response to said controlled oscillator as said automatic frequency and phase control signal;

a decimation filter connected for re-sampling said real component of said digital baseband signal supplied from said digital synchrodyne circuitry to generate, as a decimation filter response, a real component of digital baseband signal re-sampled at said prescribed baud rate;

decoding apparatus connected for decoding said decimation filter response to recover a data stream;

estimation circuitry responsive to said decimation filter response for generating an oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated;

a balanced amplitude modulator for modulating an oversampling-rate digital signal descriptive of an unmodulated intermediate-frequency carrier by said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, thereby to generate an oversampling-rate digital signal descriptive of a suppressed-carrier double-sideband signal, said balanced amplitude modulator connected to receive digital descriptions of oscillations from said digital controlled oscillator as said oversampling-rate digital signal descriptive of the unmodulated intermediate-frequency carrier;

an ideal-channel-response vestigial-sideband filter for supplying a vestigial-sideband filter response to said oversampling-rate digital signal descriptive of a suppressed-carrier double-sideband signal supplied to said vestigial-sideband filter as its respective input signal by a connection from said balanced amplitude modulator;

apparatus for computing discrete Fourier transforms of successive portions of said vestigial-sideband filter response, which successive portions of said vestigial-sideband filter response correspond with respective ones of said successive portions of said amplitude-modulated intermediate-frequency carrier used for computing said discrete Fourier transforms thereof;

computer circuitry for generating discrete Fourier transform descriptions of the kernel desired in said first adaptive filter through term-by-corresponding-term division of each of the discrete Fourier transforms of successive portions of said vestigial-sideband filter response by the discrete Fourier transform of the corresponding portion of said amplitude-modulated intermediate-frequency carrier, and thereafter generating inverse discrete Fourier transforms of said discrete Fourier transform descriptions of the kernel desired in said first adaptive filter; and

a bank of digital lowpass filters for smoothing the terms of said inverse discrete Fourier transforms to specify the weighting coefficients in the kernel of said first adaptive filter.

16. Receiver apparatus for single-carrier digital modulation signals of a prescribed baud rate transmitted by respective amplitude-modulated radio-frequency carriers through a medium subject to multipath distortion, said receiver apparatus comprising:

a receiver front-end connected for responding to any selected one of said single-carrier digital modulation signals transmitted at radio frequencies, thereby to supply a converted digital modulation signal at intermediate frequencies;

demodulator and oversampling analog-to-digital conversion circuitry connected for responding to said converted digital modulation signal to supply a first digital baseband signal and a second digital baseband signal, said first digital baseband signal resulting from synchrodyning said converted digital modulation signal with an intermediate-frequency carrier of a leading first phasing, said second digital baseband signal resulting from synchrodyning said converted digital modulation signal with an intermediate-frequency carrier of a lagging second phasing in quadrature with said leading first phasing;

first and second adaptive filters, each having a respective kernel composed of weighting coefficients that can be adjusted, said first adaptive filter connected to receive as its respective input signal said first digital baseband signal supplied by said demodulator and oversampling analog-to-digital conversion circuitry, said first adaptive filter connected to supply a first adaptive filter response to its respective input signal, said second adaptive filter connected to receive as its said respective input signal said second digital baseband signal supplied by said demodulator and oversampling analog-to-digital conversion circuitry, and said second adaptive filter connected to supply a second adaptive filter response to its respective input signal;

a first decimation filter connected for re-sampling said first adaptive filter response to generate, as a first decimation filter response, the first digital baseband signal re-sampled at said prescribed baud rate;

a second decimation filter connected for re-sampling said second adaptive filter response to generate, as a second decimation filter response, the second digital baseband signal re-sampled at said prescribed baud rate;

a first adaptive-filter-kernel computer for computing the weighting coefficients in the kernel of said first adaptive filter, said first adaptive-filter-kernel computer being of a type using discrete Fourier transform procedures in its computations, said first adaptive-filter-kernel computer connected to receive said first decimation filter response and to receive said first digital baseband signal supplied by said demodulator and oversampling analog-to-digital conversion circuitry;

a second adaptive-filter-kernel computer for computing the weighting coefficients in the kernel of said first adaptive filter, said second adaptive-filter-kernel computer being of a type using discrete Fourier transform procedures in its computations, said second adaptive-filter-kernel computer connected to receive said second decimation filter response and to receive said second digital baseband signal supplied by said demodulator and oversampling analog-to-digital conversion circuitry;

a digital adder for summing said first decimation filter response and said second decimation filter response to generate a digital sum signal at said prescribed baud rate; and

decoding apparatus connected for decoding said decimation filter response to recover a data stream.

17. The claim 16 receiver apparatus, wherein said demodulator and oversampling analog-to-digital conversion circuitry comprises:

a controlled oscillator for generating oscillations, the frequency and phase of which oscillations are controlled by an automatic frequency and phase control signal;

a mixer connected for mixing said amplitude-modulated intermediate-frequency carrier supplied from receiver front-end with said oscillations to generate a mixer response;

a first analog lowpass filter connected to receive said mixer response as a respective input signal and to supply a first analog lowpass filter response thereto in which image spectrum is suppressed;

an analog-to-digital converter connected for digitizing said first analog lowpass filter response to generate a digitized first analog lowpass filter response sampled at an oversampling rate higher than said prescribed baud rate;

digital synchrodyning circuitry for responding to said digitized first analog lowpass filter response, applied to said digital synchrodyning circuitry as its respective input signal, to generate said first digital baseband signal and said second digital baseband signal;

a digital subtractor for differentially combining said first decimation filter response and said second decimation filter response to generate a digital difference signal at said prescribed baud rate;

a digital-to-analog converter connected to receive as its respective input signal said digital difference signal from said digital subtractor and connected to supply an analog difference signal; and

a second analog lowpass filter connected to receive as its respective input signal said digitized second adaptive filter response from said digital-to-analog converter and to supply a second analog lowpass filter response therefrom to said controlled oscillator as said automatic frequency and phase control signal.

18. The claim 16 receiver apparatus, wherein said demodulator and oversampling analog-to-digital conversion circuitry comprises:

an analog-to-digital converter connected to receive as its respective input signal said amplitude-modulated intermediate-frequency carrier from said receiver front-end and to supply, at an oversampling rate higher than said prescribed baud rate, a digitized amplitude-modulated intermediate-frequency carrier;

a digital controlled oscillator for supplying at said oversampling rate digital descriptions of oscillations in said leading first phasing and in said lagging second phasing, the frequency and phase of which oscillations are controlled by an automatic frequency and phase control signal;

digital synchrodyne circuitry for generating said first digital baseband signal and said second digital baseband signal in response to said digitized amplitude-modulated intermediate-frequency carrier, said analog-to-digital converter connected to apply said digitized amplitude-modulated intermediate-frequency carrier to said digital synchrodyne circuitry as a respective input signal thereof, said digital controlled oscillator connected for supplying said descriptions of said oscillations in said leading first phasing to said digital synchrodyne circuitry for synchrodyning with said digitized amplitude-modulated intermediate-frequency carrier to generate first digital baseband signal at said oversampling rate, said controlled oscillator connected for supplying said descriptions of said oscillations in said lagging second phasing to said digital synchrodyne circuitry for synchrodyning with said digitized amplitude-modulated intermediate-frequency carrier to generate said second digital baseband signal;

a digital subtractor for differentially combining said first decimation filter response and said second decimation filter response to generate a digital difference signal at said prescribed baud rate; and

a digital lowpass filter connected to receive said digital difference signal from said digital subtractor and connected to supply its lowpass filter response to said digital controlled oscillator as said automatic frequency and phase control signal.

19. The claim 16 receiver apparatus, wherein said first adaptive-filter-kernel computer is operable to compute the discrete Fourier transforms of successive portions of said first digital baseband signal that generally are contiguous in time, to quantize said first decimation filter response and generate therefrom a first estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, to compute the discrete Fourier transforms of portions of said first estimation corresponding to said successive portions of said second digital baseband signal, to process the discrete Fourier transform of each portion of said first digital baseband signal with the discrete Fourier transform of the corresponding portion of said first decimation filter response for generating a discrete Fourier transform descriptive of the kernel desired in said first adaptive filter, to generate the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said first adaptive filter, and to generate the weighting coefficients for the kernel of said first adaptive filter by lowpass filtering each of the terms of the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said first adaptive filter; and wherein said second adaptive-filter-kernel computer is operable to compute the discrete Fourier transforms of successive portions of said second digital baseband signal that generally are contiguous in time, to quantize said second decimation filter response and generate therefrom a second estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, to compute the discrete Fourier transforms of portions of said second estimation corresponding to said successive portions of said second digital baseband signal, to process the discrete Fourier transform of each portion of said second digital baseband signal with the discrete Fourier transform of the corresponding portion of said second decimation filter response for generating a discrete Fourier transform descriptive of the kernel desired in said second adaptive filter, to generate the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said second adaptive filter, and to generate the weighting coefficients for the kernel of said second adaptive filter by lowpass filtering each of the terms of the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said second adaptive filter.

20. Receiver apparatus for single-carrier digital modulation signals of a prescribed baud rate transmitted by respective amplitude-modulated radio-frequency carriers through a medium subject to multipath distortion, said receiver apparatus comprising:

apparatus for converting a selected one of said single-carrier digital modulation signals transmitted at radio frequencies to an amplitude-modulated intermediate-frequency carrier;

an analog-to-digital converter connected to receive as its respective input signal said amplitude-modulated intermediate-frequency carrier from said apparatus for converting a selected one of said single-carrier digital modulation signals and to supply, at an oversampling rate higher than said prescribed baud rate, a digitized amplitude-modulated intermediate-frequency carrier;

a phase-splitter connected to receive as its respective input signal said digitized amplitude-modulated intermediate-frequency carrier supplied from said analog-to-digital converter, said phase-splitter operable to supply orthogonal first and second phase-splitter responses;

first and second adaptive filters, each having a respective kernel composed of weighting coefficients that can be adjusted, said first adaptive filter connected to receive as its respective input signal said first phase-splitter response supplied by said phase-splitter, said first adaptive filter connected to supply a first adaptive filter response to its respective input signal, said second adaptive filter connected to receive as its said respective input signal said second phase-splitter response supplied by said phase-splitter and oversampling analog-to-digital conversion circuitry, and said second adaptive filter connected to supply a second adaptive filter response to its respective input signal;

digital synchrodyne circuitry connected for generating at said oversampling rate a first digital baseband signal by synchrodyning said first adaptive filter response with an intermediate-frequency carrier of a leading first phasing and for generating at said oversampling rate a second digital baseband signal by synchrodyning said second adaptive filter response with an intermediate-frequency carrier of a lagging second phasing;

a first decimation filter connected for supplying a first decimation filter response generated by re-sampling to said prescribed baud rate said first digital baseband signal generated by said digital synchrodyne circuitry;

a second decimation filter connected for supplying a second decimation filter response generated by re-sampling to said prescribed baud rate said second digital baseband signal generated by said digital synchrodyne circuitry;

a first adaptive-filter-kernel computer for computing the weighting coefficients in the kernel of said first adaptive filter, said first adaptive-filter-kernel computer being of a type using discrete Fourier transform procedures in its computations, said first adaptive-filter-kernel computer connected to receive said first decimation filter response and to receive said first phase-splitter response supplied by said phase-splitter:

a second adaptive-filter-kernel computer for computing the weighting coefficients in the kernel of said second adaptive filter, said second adaptive-filter-kernel computer being of a type using discrete Fourier transform procedures in its computations, said second adaptive-filter-kernel computer connected to receive said second decimation filter response and to receive said second phase-splitter response supplied by said phase-splitter;

a digital adder for summing said first decimation filter response and said second decimation filter response to generate a digital sum signal at said prescribed baud rate; and

decoding apparatus connected for decoding said decimation filter response to recover a data stream.

21. The claim 20 receiver apparatus, wherein said apparatus for converting a selected one of said single-carrier digital modulation signals transmitted at radio frequencies to an amplitude-modulated intermediate-frequency carrier comprises:

a receiver front-end connected for responding to any selected one of said single-carrier digital modulation signals transmitted at radio frequencies, thereby to supply a converted digital modulation signal;

a controlled oscillator for generating oscillations, the frequency and phase of which oscillations are controlled by an automatic frequency and phase control signal;

a mixer connected for mixing converted digital modulation signal supplied from receiver front-end with said oscillations to generate a mixer response including said amplitude-modulated intermediate-frequency carrier;

a first analog lowpass filter connected to receive said mixer response as a respective input signal and to supply a first analog lowpass filter response thereto,

which includes said amplitude-modulated intermediate-frequency carrier substantially free of accompanying image signal and is applied to said analog-to-digital converter as its respective input signal;

a digital subtractor for differentially combining said first decimation filter response and said second decimation filter response to generate a digital difference signal at said prescribed baud rate;

a digital-to-analog converter connected to receive as its respective input signal said digital difference signal from said digital subtractor and connected to supply an analog difference signal; and

a second analog lowpass filter connected to receive as its respective input signal said analog difference signal from said digital-to-analog converter and to supply a second analog lowpass filter response to said controlled oscillator as said automatic frequency and phase control signal.

22. The claim 21 receiver apparatus, wherein said apparatus for converting a selected one of said single-carrier digital modulation signals transmitted at radio frequencies to an amplitude-modulated intermediate-frequency carrier is essentially a receiver front-end connected for supplying said amplitude-modulated intermediate-frequency carrier responsive to any selected one of said single-carrier digital modulation signals transmitted at radio frequencies, said receiver apparatus further comprising:

a digital controlled oscillator for supplying at said oversampling rate digital descriptions of oscillations at said intermediate-frequency carrier frequency in said leading first phasing and of oscillations at said intermediate-frequency carrier frequency in said lagging second phasing, the frequency and phase of which oscillations are controlled by an automatic frequency and phase control signal, said digital controlled oscillator connected for supplying said descriptions of oscillations at said intermediate-frequency carrier frequency in said leading first phasing to said digital synchrodyne circuitry for synchrodyning with said first adaptive filter response, said digital controlled oscillator connected for supplying said descriptions of oscillations at said lagging second phasing to said digital synchrodyne circuitry for synchrodyning with said second adaptive filter response;

a digital subtractor for differentially combining said first decimation filter response and said second decimation filter response to generate a digital difference signal at said prescribed baud rate; and

a digital lowpass filter connected to receive said digital difference signal from said digital subtractor and connected to supply its lowpass filter response to said digital controlled oscillator as said automatic frequency and phase control signal.

23. The claim 20 receiver apparatus, wherein said first adaptive-filter-kernel computer is operable to compute the discrete Fourier transforms of successive portions of said first phase-splitter response that generally are contiguous in time, to quantize said first decimation filter response and generate therefrom a first estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, to generate a first re-modulation signal by modulating said intermediate-frequency carrier of said leading first phasing with said first estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, to compute the discrete Fourier transforms of portions of said first re-modulation signal corresponding to said successive portions of said first phase-splitter response, to process the discrete Fourier transform of each portion of said first phase-splitter response with the discrete Fourier transform of the corresponding portion of said first re-modulation signal for generating a discrete Fourier transform descriptive of the kernel desired in said first adaptive filter, to generate the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said first adaptive filter, and to generate the weighting coefficients for the kernel of said first adaptive filter by lowpass filtering each of the terms of the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said first adaptive filter; and wherein said second adaptive-filter-kernel computer is operable to compute the discrete Fourier transforms of successive portions of said second phase-splitter response that generally are contiguous in time, to quantize said second decimation filter response and generate therefrom a second estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, to generate a second re-modulation signal by modulating said intermediate-frequency carrier of said lagging second phasing with said second estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated,

to compute the discrete Fourier transforms of portions of said second re-modulation signal corresponding to said successive portions of said second phase-splitter response, to process the discrete Fourier transform of each portion of said second phase-splitter response with the discrete Fourier transform of the corresponding portion of said second re-modulation signal for generating a discrete Fourier transform descriptive of the kernel desired in said second adaptive filter, to generate the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said second adaptive filter, and to generate the weighting coefficients for the kernel of said second adaptive filter by lowpass filtering each of the terms of the inverse discrete Fourier transform of said discrete Fourier transform descriptive of the kernel desired in said second adaptive filter.

24. Receiver apparatus for digital signals of a prescribed baud rate transmitted by respective amplitude-modulated radio-frequency carriers through a medium subject to multipath distortion, said receiver apparatus comprising:

a receiver front-end connected for responding to any selected one of said digital signals transmitted by respective amplitude-modulated radio-frequency carriers through a medium subject to multipath distortion, to generate an amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion thereof;

demodulator and oversampling analog-to-digital conversion circuitry connected to receive said amplitude-modulated intermediate-frequency carrier from said receiver front-end and to supply a digital baseband signal at an oversampling rate higher than said prescribed baud rate;

an analyzer filter for generating the discrete Fourier transform of successive portions of said digital baseband signal, said analyzer filter connected to receive said digital baseband signal from said demodulator and oversampling analog-to-digital conversion circuitry;

a bank of multipliers for multiplying the terms of said discrete Fourier transform of said digital baseband signal, term by term, by respective ones of a set of weighting coefficients to generate a set of products describing the discrete Fourier transform of an equalizer response to said digital baseband signal;

a synthesizer filter connected for receiving said set of products from said bank of multipliers and for generating therefrom said equalizer response as the inverse discrete Fourier transform of said discrete Fourier transform of said equalizer response described by said set of products;

a decimation filter connected for re-sampling said equalizer response supplied from said synthesizer filter to generate as a decimation filter response an equalized digital baseband signal re-sampled at said prescribed baud rate; and

decoding apparatus connected for decoding said decimation filter response to recover a data stream.

25. The claim 24 receiver apparatus, further comprising:

apparatus for computing the discrete Fourier transforms of successive portions of each data field of said digital baseband signal, as supplied by said demodulator and oversampling analog-to-digital conversion circuitry;

estimation circuitry responsive to said decimation filter response for generating a oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated;

apparatus for computing the discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, which successive portions of said oversampling-rate estimation of the baseband digital modulating signal correspond with respective ones of said successive portions of said digital baseband signal used for computing discrete Fourier transforms in said apparatus for computing the discrete Fourier transforms of successive portions of said digital baseband signal;

read-only memory for storing a discrete Fourier transform characterization of ideal channel response;

computer circuitry for generating discrete Fourier transform descriptions of said set of weighting coefficients, through term-by-corresponding-term multiplication of each of said discrete Fourier transforms of successive portions of said oversampling-rate estimation of the baseband digital modulating signal by said discrete Fourier transform characterization of ideal reception channel response as read from read-only memory, followed by term-by-corresponding-term division of the resulting product terms by the discrete Fourier transform from the portion of said digital baseband signal corresponding with that said successive portion of said oversampling-rate estimation of the baseband digital modulating signal used for generating said discrete Fourier transform thereof used in said term-by-corresponding-term multiplication, thereby generating one of successive discrete Fourier transform descriptions of said set of weighting coefficients; and

a bank of digital lowpass filters for smoothing respective resulting terms of said successive discrete Fourier transform descriptions of said set of weighting coefficients, to generate respective lowpass filter responses applied to said bank of multipliers as said set of weighting coefficients.

26. The claim 24 receiver apparatus, further comprising:

apparatus for computing the discrete Fourier transforms of successive portions of each data field of said digital baseband signal, as supplied by said demodulator and oversampling analog-to-digital conversion circuitry;

estimation circuitry responsive to said decimation filter response for generating a Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated;

apparatus for computing the discrete Fourier transforms of successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, which successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal correspond with respective ones of said successive portions of said digital baseband signal used for computing discrete Fourier transforms in said apparatus for computing the discrete Fourier transforms of successive portions of said digital baseband signal;

computer circuitry for generating discrete Fourier transform descriptions of said set of weighting coefficients, through term-by-corresponding-term division of each of the discrete Fourier transforms of successive portions of said Nyquist-filtered oversampling-rate estimation of the baseband digital modulating signal by the discrete Fourier transform of the corresponding portion of said digital baseband, thereby generating one of successive discrete Fourier transform descriptions of said set of weighting coefficients; and

a bank of digital lowpass filters for smoothing respective resulting terms of said successive discrete Fourier transform descriptions of said set of weighting coefficients to generate respective lowpass filter responses applied to said bank of multipliers as said set of weighting coefficients.

27. Receiver apparatus for digital signals of a prescribed baud rate transmitted by respective amplitude-modulated radio-frequency carriers through a medium subject to multipath distortion, said receiver apparatus comprising:

a receiver front-end connected for responding to any selected one of said digital signals transmitted by respective amplitude-modulated radio-frequency carriers through a medium subject to multipath distortion, to generate an amplitude-modulated intermediate-frequency carrier that is amplitude-modulated in accordance with said selected one of said digital signals and any multipath distortion thereof;

analog-to-digital conversion circuitry connected to receive as its respective input signal said amplitude-modulated intermediate-frequency carrier from said receiver front-end and to supply, at an oversampling rate higher than said prescribed baud rate, a digitized amplitude-modulated intermediate-frequency carrier;

an analyzer filter for generating the discrete Fourier transform of successive portions of said digitized amplitude-modulated intermediate-frequency carrier, said analyzer filter connected to receive said amplitude-modulated intermediate-frequency carrier from said receiver front-end;

a bank of multipliers for multiplying the terms of said discrete Fourier transform of said amplitude-modulated intermediate-frequency carrier, term by term, by respective ones of a set of weighting coefficients to generate a set of products describing the discrete Fourier transform of an equalizer response to said amplitude-modulated intermediate-frequency carrier;

a synthesizer filter connected for receiving said set of products from said bank of multipliers and for generating therefrom said equalizer response as the inverse discrete Fourier transform of said discrete Fourier transform of said equalizer response described by said set of products;

digital synchrodyne circuitry connected to receive said equalizer response from said synthesizer filter and to supply a digital baseband signal at an oversampling rate higher than said prescribed baud rate;

a decimation filter connected for re-sampling said digital baseband signal supplied from said demodulator and oversampling analog-to-digital conversion circuitry, to generate as a decimation filter response an equalized digital baseband signal re-sampled at said prescribed baud rate; and

decoding apparatus connected for decoding said decimation filter response to recover a data stream.

28. The claim 27 receiver apparatus, further comprising:

apparatus for computing the discrete Fourier transforms of successive portions of each data field of said digitized amplitude-modulated intermediate-frequency carrier, said analog-to-digital conversion circuitry being connected to supply said digitized amplitude-modulated intermediate-frequency carrier to said apparatus for computing the discrete Fourier transforms of successive portions of each data field of said digitized amplitude-modulated intermediate-frequency carrier;

estimation circuitry responsive to said decimation filter response for generating an oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated;

a balanced amplitude modulator for modulating an oversampling-rate digital signal descriptive of an unmodulated intermediate-frequency carrier by said oversampling-rate estimation of the baseband digital modulating signal in accordance with which said selected one of said single-carrier digital modulation signals was generated, thereby to generate an oversampling-rate digital signal descriptive of a suppressed-carrier double-sideband signal;

an ideal-channel-response vestigial-sideband filter for supplying a vestigial-sideband filter response to said oversampling-rate digital signal descriptive of a suppressed-carrier double-sideband signal supplied to said vestigial-sideband filter as its respective input signal by a connection from said balanced amplitude modulator;

a further analyzer filter for computing discrete Fourier transforms of successive portions of said vestigial-sideband filter response, which successive portions of said vestigial-sideband filter response correspond with respective ones of said successive portions of said amplitude-modulated intermediate-frequency carrier used for computing said discrete Fourier transforms thereof;

computer circuitry for generating discrete Fourier transform descriptions of said set of weighting coefficients, through term-by-corresponding-term division of each of the discrete Fourier transforms of successive portions of said vestigial-sideband filter response by the discrete Fourier transform of the corresponding portion of said digitized amplitude-modulated intermediate-frequency carrier, thereby generating one of successive discrete Fourier transform descriptions of said set of weighting coefficients; and

a bank of digital lowpass filters for smoothing respective resulting terms of said successive discrete Fourier transform descriptions of said set of weighting coefficients to generate respective lowpass filter responses applied to said bank of multipliers as said set of weighting coefficients.